Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands	)	GN Docket No. 13-185
	)	
Service Rules for Advanced Wireless Services in the 2155-2175 MHz Band	)	WT Docket No. 07-195 (Proceeding Terminated)
	)	
Service Rules for Advanced Wireless Services in the 1915-1920 MHz, 1995-2000 MHz, 2020-2025 MHz, and 2175-2180 MHz Bands	)	WT Docket No. 04-356 (Proceeding Terminated)
	)	
Applications for License and Authority to Operate in the 2155-2175 MHz Band	)	WT Docket No. 07-16 (Proceeding Terminated)
	)	
Petitions for Forbearance Under 47 U.S.C. § 160	)	WT Docket No. 07-30 (Proceeding Terminated)

COMMENTS OF T-MOBILE USA, INC.

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SUMMARY

T-Mobile USA, Inc. ("T-Mobile") applauds the Commission's efforts to make spectrum in the 1695-1710 MHz, 1755-1780 MHz, 2020-2025 MHz, and 2155-2180 MHz bands available for commercial Advanced Wireless Services ("AWS") (together, the "AWS-3 bands"). As the Commission and others have recognized, there is an urgent need for spectrum to meet the growing demand for mobile broadband services. Congress and the President have recognized that AWS-3 spectrum can help meet those needs.

T-Mobile also appreciates the efforts by the National Telecommunications and Information Administration ("NTIA"), the Commerce Spectrum Management Advisory Committee ("CSMAC") Working Groups, and the Department of Defense ("DoD") in evaluating federal spectrum in certain key bands and presenting a path forward for making such spectrum available to commercial users. For the 1695-1710 MHz band, T-Mobile agrees with the sharing approach outlined in the CSMAC Working Group 1 Report and specifically supports the adoption of coordination procedures patterned after the process that was used to allow non-federal licensees to gain early access to AWS-1 spectrum. In order to make the best use of the 1695-1710 MHz band, the Commission should also consider pairing the band with the 2095-2110 MHz band as proposed by CTIA—The Wireless Association ("CTIA").

For the 1755-1780 MHz band, the Commission should use the proposal submitted by DoD, which is largely consistent with the recommendations of the *Industry Roadmap* submitted by T-Mobile, as the basis for planning for the future use of the 1755-1780 MHz band. According to the *DoD Alternative Proposal*, numerous agency operations can vacate the 1755-1780 MHz band, reducing the need for permanent coordination procedures and protection zones. The proposal stems from "considering the myriad of technical, statutory, and other factors

involved," including NTIA's assessment of the 1755-1850 MHz band, CSMAC Working Groups, DoD/industry spectrum monitoring, internal compression studies, and requirements of the Commercial Spectrum Enhancement Act and Fiscal Year 2000 National Defense Authorization Act. It offers a solution to make the 1755-1780 MHz band available for auction in the timeframe necessary to be paired and auctioned with the 2155-2180 MHz band, while protecting critical capabilities.

While the conversion of the 1755-1780 MHz band to commercial use should be the priority, T-Mobile strongly supports continued review of the rest of the 1755-1850 MHz band – the 1780-1850 MHz band – for long-term commercial use. The Commission should also leave open the possibility that spectrum in the 2025-2110 MHz band could be made available for wireless broadband. Although the National Aeronautics and Space Administration ("NASA") has expressed concerns with commercial use of this band, NASA's study has several flaws and should not be conclusive with regard to use of the 2025-2110 MHz band for mobile broadband services in the future.

T-Mobile does not object to federal use of non-federal spectrum in areas where wireless providers are generally not providing service. However, it is premature for the Commission to adopt rules for sharing in commercial bands at this time. In particular, T-Mobile supports DoD's proposal for access to the 2025-2110 MHz band but, as noted above, suggests that the 2095-2110 MHz band be dedicated for commercial use and paired with the 1695-1710 MHz band.

Finally, T-Mobile generally supports the Commission's proposed band use configurations, licensing scheme, out-of-band emissions limits, antenna height limits, co-channel interference requirements, and power limits. T-Mobile likewise generally supports the FCC's proposed performance requirements and competitive bidding procedures.

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COMMENTS OF T-MOBILE USA, INC.

T-Mobile USA, Inc. ("T-Mobile")[1/] submits these comments in response to the Notice of Proposed Rulemaking issued by the Commission in the above-referenced proceeding,[2/] seeking comment on proposals that would make available spectrum in the 1695-1710 MHz, 1755-1780 MHz, 2020-2025 MHz, and 2155-2180 MHz bands for commercial Advanced Wireless Services ("AWS") (together, the "AWS-3 bands"). T-Mobile applauds the Commission's efforts to make the AWS-3 bands available for commercial use to meet the continued growing demands of wireless carriers and looks forward to working with all stakeholders to ensure a timely auction of the AWS-3 spectrum.

1/ T-Mobile USA, Inc. is a wholly-owned subsidiary of T-Mobile US, Inc., a publicly traded company.

2/ *See Amendment of the Commission's Rules with Regard to Commercial Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands, et al.*, Notice of Proposed Rulemaking and Order on Reconsideration, GN Docket No. 13-185, *et al.*, FCC 13-102 (rel. July 23, 2013) ("*NPRM*").

I. INTRODUCTION

As the fourth largest wireless carrier in the United States, T-Mobile together with the MetroPCS brand offers nationwide wireless voice, text, and data services to approximately 44 million subscribers,[3/] employs almost 38,000 people with a payroll of more than $2 billion, and has invested more than $3.5 billion last year in the U.S.[4/] T-Mobile's spectrum holdings are primarily in the AWS and Personal Communications Service ("PCS") bands. The company has continuously implemented new and more efficient technologies to maximize the capacity of its spectrum and has invested significant funds to expand its spectrum portfolio and rationalize its existing spectrum holdings.[5/] T-Mobile has been busy reinvigorating its brand in recent months – completing an important corporate merger[6/] and overhauling its business model with its

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3/ *See* T-Mobile News Release, *T-Mobile US Reports Second Quarter 2013 Results* (Aug. 8, 2013) ("T-Mobile Q2 Press Release"), *available at* http://newsroom.t-mobile.com/phoenix.zhtml?c=251624&p=irol-newsArticle&ID=1845964&highlight=.

4/ *See Oversight of Incentive Auction Implementation*, 113th Cong. 1 (July 23, 2013) (written testimony of Kathleen O'Brien Ham, Vice President, Federal Regulatory Affairs, T-Mobile), *available at* http://docs.house.gov/meetings/IF/IF16/20130723/101177/HHRG-113-IF16-Wstate-HamK-20130723.pdf.

5/ *See, e.g.*, T-Mobile News Release, *T-Mobile Agrees to Acquire AWS Spectrum in Mississippi Valley Region from U.S. Cellular* (June 28, 2013), *available at* http://newsroom.t-mobile.com/phoenix.zhtml?c=251624&p=irol-newsArticle&ID=1833844&highlight= (announcing T-Mobile's recent agreement with U.S. Cellular to purchase 10 megahertz of AWS spectrum to allow an incremental roll-out of T-Mobile's 4G LTE network coverage to new markets and to expand its existing 4G LTE bandwidth in the Mississippi Valley region); Applications of T-Mobile License LLC, NTCH, Inc., and DareDevil Communications, LLC for Consent to Assign Licenses, ULS File No. 0005834009, at Description of Transaction and Public Interest Statement at 1 (filed July 2, 2013) (stating that the proposed transfers of PCS and AWS spectrum "will result in efficiency benefits to both Parties associated with larger blocks of contiguous spectrum and/or alignment of spectrum held in adjacent markets, thereby benefiting consumers").

6/ On May 1, 2013, T-Mobile announced the completion of its merger with MetroPCS Communications Inc. ("MetroPCS") and now represents the interests of both the T-Mobile and MetroPCS brands. *See* T-Mobile News Release, *T-Mobile and MetroPCS Combination Complete – Wireless Revolution Just Beginning* (May 1, 2013), *available at* http://phx.corporate-ir.net/phoenix.zhtml?c=251624&p=irol-newsArticle&ID=1813495&highlight=.

innovative "Un-Carrier" strategy and groundbreaking JUMP plan.[7/] The company also is making substantial progress in its network modernization and 4G Long-Term Evolution ("LTE") effort, recently announcing the launch of 4G LTE in 154 metropolitan areas covering 180 million people.[8/] T-Mobile is on pace to meet its previously stated goal of reaching 200 million people with 4G LTE by the end of this year.[9/]

T-Mobile's strategy and activities are having a disruptive impact on the wireless market, but it needs access to new spectrum in order to continue this growth and remain competitive with the nation's largest wireless carriers. T-Mobile also has long encouraged the Commission to make the AWS-3 bands available to meet the urgent need for additional commercial wireless broadband spectrum, most recently by submitting the *Industry Roadmap* highlighted in the *NPRM* and further discussed in these comments.[10/] As a result, T-Mobile has a great interest in this proceeding and is pleased to submit these comments.

7/ *See* T-Mobile News Release, *T-Mobile Announces Boldest Moves Yet as America's Un-carrier* (July 10, 2013), *available at* http://newsroom.t-mobile.com/phoenix.zhtml?c=251624&p=irol-newsArticle&ID=1836669&highlight.

8/ *See* T-Mobile News Release, *T-Mobile to Offer iPhone 5s and iPhone 5c* (Sept. 12, 2013), *available at* http://newsroom.t-mobile.com/phoenix.zhtml?c=251624&p=irol-newsArticle&ID=1854553&highlight=.

9/ *See* T-Mobile Q2 Press Release.

10/ *See, e.g.*, *NPRM* ¶ 22; *Industry Roadmap to Assessing the 1755-1850 MHz Band* ("*Industry Roadmap*"), *attached to* Letter from Steve Sharkey, T-Mobile, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 10-123, WT Docket No. 07-195 (filed June 24, 2013) (assessing the entire 1755-1850 MHz band in a manner that considers making the lower 1755-1780 MHz band available first, but also addressing the rest of the band up to 1850 MHz in order to meet federal agencies' concerns); Comments of T-Mobile US, Inc., WT Docket No. 13-135, at 6-8 (filed June 17, 2013) (supporting the transition of the 1755-1780 MHz band to commercial mobile services and the pairing of that band with the 2155-2180 MHz band for auction); Comments of T-Mobile USA, Inc., IB Docket No. 04-286, at 1 (filed March 22, 2013) ("T-Mobile agrees with the [World Radiocommunication Conference]'s recommendation that the United States support the development of technical requirements that will ultimately lead to a primary mobile allocation in the 1695-1710 MHz band and identification of the band for broadband wireless services."); Comments of T-Mobile USA, Inc., ET Docket No. 10-123, at 8 (filed Apr. 22, 2011) (advocating that the Commission repurpose the 1755-1780 MHz band for commercial use).

A. The *NPRM* is Consistent with the Recognized Need for Wireless Broadband Capacity

The Commission has found that, despite advances in technology, there is an urgent need for more spectrum to meet growing demand.[11/] The proliferation of the number and type of wireless devices,[12/] the increasing adoption of bandwidth-intensive tablets and smartphones,[13/] and skyrocketing global mobile data traffic,[14/] among other trends, compel the Commission to take the type of action envisioned by the *NPRM* to ensure adequate spectrum is available in the

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11/ *See Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993; Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless, Including Commercial Mobile Services*, Sixteenth Report, 28 FCC Rcd 3700, ¶ 87 (2013) ("*Sixteenth Competition Report*") (noting that "the spectrum currently allocated to wireless is not sufficient to handle the projected growth in demand, even with technological improvements allowing for more efficient use of existing spectrum and significant investment in new facilities") (citing Council of Economic Advisers, Executive Office of the President, *The Economic Benefits of New Spectrum for Wireless Broadband*, at 1 (Feb. 2012), *available at* http://www.whitehouse.gov/sites/default/files/cea_spectrum_report_2-21-2012.pdf); *see also* Deloitte, *The Looming Spectrum Shortage: Worse Before It Gets Better* (2013), *available at* http://www.deloitte.com/view/en_GX/global/industries/technology-media-telecommunications/tmtpredictions-2013/tmt-predictions-2013-telecommunications/2e6556e5dd1eb310VgnVCM2000003356f70aRCRD.htm#.UbZNz9Lql8E ("Fourth generation (4G) technologies such as LTE have substantially improved spectral efficiency. . . . However in the seven years it has taken to develop and widely deploy this new technology, wireless traffic increased 30-fold. Telecommunication equipment vendors simply can't invent new technologies fast enough to meet growing demand.").

12/ *See, e.g.*, *NPRM* ¶ 4 (stating that "the total number of mobile wireless connections now exceeds the total U.S. population"); *Sixteenth Competition Report* ¶ 87 ("Rapid adoption of smartphones and tablet computers, wide-spread use of mobile applications, and deployment of high-speed 3G and 4G technologies are driving more intensive use of mobile networks.").

13/ *See, e.g.*, *NPRM* ¶ 4 (stating that 55 percent of U.S. mobile subscribers owned smartphones as of the second quarter of 2012 and noting that 34 percent of American adults now own a tablet computer, devices which "generated on average approximately 2.4 times the amount of mobile traffic as the average smartphone in 2012"); *Sixteenth Competition Report* ¶ 87 ("In 2012, a single smartphone could generate as much traffic as 50 basic-feature phones, while a tablet could generate as much traffic as 120 basic-feature phones and a single laptop as much traffic as 368 basic-feature phones.").

14/ *See, e.g.*, *NPRM* ¶ 4 (citing analyses that predict that by 2017 "Internet Protocol ('IP') traffic from wireless and mobile devices will likely exceed traffic from wired devices"); *Sixteenth Competition Report* ¶ 87 ("[G]lobal mobile data traffic is anticipated to grow thirteen-fold between 2012 and 2017.").

future. Making the AWS-3 bands available is critical to enabling wireless broadband to continue to support economic growth, job creation, and global competitiveness.[15/]

Congress and President Obama have also recognized the need to make additional spectrum available for wireless broadband, particularly from federal agencies. In 2010, President Obama directed the National Telecommunications and Information Administration ("NTIA") to collaborate with the Commission "to make available a total of 500 megahertz of Federal and non-Federal spectrum over the next ten years, suitable for both mobile and fixed wireless broadband use."[16/] Building upon this directive, the President recently released a memorandum finding that although existing efforts will almost double the amount of spectrum available for wireless broadband, even more spectrum must be made available.[17/] This memorandum also instructed NTIA and the FCC to consider shared access to federal spectrum by non-federal operations to "enhance efficiency among all users and expedite commercial access to spectrum that is currently allocated exclusively for Federal use."[18/]

The Middle Class Tax Relief and Job Creation Act of 2012 (the "Spectrum Act")[19/] likewise recognizes the need to free federal spectrum for commercial operations and expresses Congress' priority for relocation over sharing.[20/] In particular, the Spectrum Act states that "[i]n evaluating

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15/ *See NPRM* ¶ 4; Pew Research Center, *Cell Internet Use 2013* (Sept. 16, 2013), *available at* http://pewinternet.org/~/media//Files/Reports/2013/PIP_CellInternetUse2013.pdf (observing that 57 percent of American adults use their cell phone to go online and, for many younger adults, lower-income Americans, and minorities, cell phones are often a primary device for accessing online content).

16/ *Unleashing the Wireless Broadband Revolution*, 75 Fed. Reg. 38385, 38388 (July 1, 2010) ("*2010 Presidential Memorandum*").

17/ *See Expanding America's Leadership in Wireless Innovation*, 78 Fed. Reg. 37431, 37431 (June 20, 2013) ("*2013 Presidential Memorandum*").

18/ *Id.*

19/ *See* Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, 126 Stat. 156 (2012), codified at 47 U.S.C. § 1401 *et seq.* ("Spectrum Act").

20/ *See id.* § 923(j)(1).

a band of frequencies for possible reallocation for exclusive non-Federal use or shared use, the NTIA shall give priority to options involving reallocation of the band for exclusive non-Federal use and shall choose options involving shared use only when it determines . . . that relocation of a Federal entity from the band is not feasible because of technical or cost restraints."[21/]

B. The *NPRM* Follows the Collaborative Work of NTIA and other Federal Agencies

The *NPRM's* proposal to make federal spectrum available for commercial use is a result, in part, of the efforts that NTIA and others have invested over the past several years and T-Mobile applauds that work. The work already performed sets a path forward to making even more federal spectrum available in the future. NTIA initially identified the 1695-1710 MHz band as available for transition to non-federal operations in its "fast track" review of bands that could be reallocated to mobile use.[22/] This evaluation also called for further evaluation of the feasibility of reallocating the 1755-1850 MHz band.[23/] In March 2012, NTIA concluded that it was possible to make the 1755-1850 MHz band available for commercial use, but that it would be complex, time-consuming, and costly based on the information available.[24/] NTIA also concluded that the agencies needed to engage with industry to seek to address the challenges involved with making the band available for commercial use.[25/]

21/ *Id.*

22/ *See* U.S. Dep't of Commerce, *An Assessment of the Near-Term Viability of Accommodating Wireless Broadband Systems in the 1675-1710 MHz, 1755-1780 MHz, 3500-3650 MHz, and 4200-4220 MHz Bands* (Oct. 2010), *available at* http://www.ntia.doc.gov/files/ntia/publications/fasttrackevaluation_11152010.pdf; *see also NPRM* ¶ 8.

23/ *See id.*

24/ *See* U.S. Dep't of Commerce, *An Assessment of the Viability of Accommodating Wireless Broadband in the 1755-1850 MHz Band*, at 45-47 (March 2012) ("NTIA March 2012 Letter"), *available at* http://www.ntia.doc.gov/files/ntia/publications/ntia_1755_1850_mhz_report_march2012.pdf; *see also NPRM* ¶ 9.

25/ *See* NTIA March 2012 Letter at iii.

Based on this assessment, NTIA directed its Commerce Spectrum Management Advisory Committee ("CSMAC"), in which T-Mobile played a leading role, to continue to evaluate how to make federal spectrum available. As the *NPRM* notes, the five CSMAC Working Groups have provided critical input to begin to make the 1695-1710 MHz and 1755-1850 MHz bands available for commercial broadband operations.[26/] The final reports of Working Groups 1 and 2 were transmitted to the Commission in April 2013, and the remaining three reports were recently approved by the full CSMAC.[27/] T-Mobile shares NTIA's assessment that "CSMAC's work marks an important milestone in the collaborative efforts between industry and government stakeholders to free up additional spectrum for wireless broadband while balancing the mission critical capabilities of federal agencies," and that it is imperative that government agencies and the private sector continue to collaborate to solve these complex issues.[28/] T-Mobile looks forward to continuing to work with federal stakeholders as part of that effort.[29/]

Finally, the Department of Defense ("DoD") provided critical input to a plan for commercial use of government spectrum, establishing a framework for future proactive federal involvement. As the Commission noted, a July 17, 2013 letter from DoD to NTIA proposed a solution to make the 1755-1780 MHz band available for auction in the near-term, while protecting critical DoD capabilities and preserving the necessary flexibility to address the long-

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26/ *See, e.g.*, *NPRM* ¶¶ 14-19.

27/ *See* NTIA Press Release, *NTIA Applauds CSMAC's Work to Make More Spectrum Available for Commercial Use* (Aug. 28, 2013), *available at* http://www.ntia.doc.gov/print/press-release/2013/ntia-applauds-csmac-s-work-make-more-spectrum-available-commercial-use ("NTIA Release").

28/ *Id.*

29/ *See id.* (outlining several new areas of work for the CSMAC, including evaluating (i) how to update enforcement tools for new, more dynamic forms of sharing; (ii) how to implement the future work described in the Working Group Reports toward transition analysis; (iii) how agencies best quantify their actual spectrum use; (iv) spectrum management via access to databases; (v) how to provide government greater flexibility and options through access to non-federal bands; and (vi) how to pay for costs of spectrum sharing when there is no auction).

term status of the 1780-1850 MHz band.[30/] DoD is also working with commercial wireless carriers, including T-Mobile, to gather information and engage in testing regarding certain systems that may be the most difficult to relocate.[31/] The continued active participation of DoD in making AWS-3 and other spectrum available for commercial use is critical to the success of the Commission's and NTIA's spectrum policy efforts.

II. SHARED USE OF FEDERAL SPECTRUM

More than half of the spectrum that is the subject of the *NPRM* is used by federal agencies today. T-Mobile recognizes that spectrum sharing between federal and non-federal licensees may be required geographically and temporally because of this incumbent use. However, Congress and the Commission recognize the need to provide commercial carriers with clear, unencumbered spectrum. In evaluating using federal spectrum for commercial purposes, the Spectrum Act prioritizes relocation of federal operations over sharing with them.[32/] The Commission in the *NPRM* also indicates its preference "to clear and allocate spectrum in these bands for exclusive commercial use to the maximum extent feasible."[33/] Accordingly, the rules adopted in this proceeding should maximize the geographic area and time that wireless carriers can have use of federal spectrum.

30/ *See* Letter from Teresa M. Takai, Chief Information Officer, Dep't of Defense, to Lawrence E. Strickling, Assistant Secretary for Communications and Information, NTIA, U.S. Dept. of Commerce (July 17, 2013) ("*DoD Alternative Proposal*"), *attached to* Letter from Karl B. Nebbia, Associate Administrator, Office of Spectrum Management, NTIA, to Julius P. Knapp, Chief, Office of Engineering and Technology, FCC, GN Docket No. 09-51, ET Docket No. 10-123 (filed July 22, 2013) ("NTIA July 2013 Letter").

31/ *See, e.g.*, *NPRM* ¶ 18.

32/ Spectrum Act § 923(j)(1) ("In evaluating a band of frequencies for possible reallocation for exclusive non-Federal use or shared use, the NTIA shall give priority to options involving reallocation of the band for exclusive non-Federal use and shall choose options involving shared use only when it determines . . . that relocation of a Federal entity from the band is not feasible because of technical or other cost constraints.").

33/ *NPRM* ¶ 1; *see also id.* ¶ 27 ("We reiterate the priority in the Spectrum Act for relocation over sharing, and our goal remains to clear and allocate spectrum for exclusive commercial use.").

A. 1695-1710 MHz

1. Federal/Non-Federal Sharing Framework

The Commission seeks comment on the sharing approach for the 1695-1710 MHz band proposed by NTIA and recommended by CSMAC.[34/] The *WG1 Final Report* proposes that the Commission reallocate the 1695-1710 MHz band with commercial licensees permitted to freely deploy outside of "Protection Zones" where federal operations are situated.[35/] Operations inside Protection Zones would require prior federal coordination. The Protection Zone process is based on a refined interference analysis – including refined LTE system parameters, propagation models, and government system parameters – resulting in a significant reduction in the anticipated separation distance at which an LTE system would potentially cause harmful interference to federal operations as compared to the separation distances justifying the exclusion zone approach previously set forth by NTIA.[36/] This approach maximizes the potential use of the band for commercial mobile broadband, both by reducing the size of the initial Protection Zone and by providing a mechanism for operations within the Protection Zone pursuant to coordination.

In order to facilitate coordination, the framework recognizes the need for clear and consistent coordination processes and enforcement mechanisms, as well as a testing program to demonstrate the viability and effectiveness of the proposed protection and mitigation methods before commercial licensees may begin operations within a Protection Zone, the details of which

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34/ *See id.* ¶ 54. In particular, CSMAC's Working Group 1 was tasked with addressing sharing issues related to this band. *See id.* ¶ 14.

35/ *See* CSMAC, *Final Report: Working Group 1 – 1695-1710 MHz Meteorological-Satellite*, at 2 (July 23, 2013) ("*WG1 Final Report*"), *available at* http://www.ntia.doc.gov/files/ntia/publications/wg1_report_07232013.pdf.

36/ *See id.* at 1.

must be established in the coming months.[37/] The *WG1 Final Report* also recognizes that all federal costs related to coordination activities must be part of the federal agencies' sharing cost estimates, fundable through the Spectrum Relocation Fund, and must remain as long as federal agencies operate in the established Protection Zones.[38/] Acknowledging that the need for spectrum for commercial services is greatest in heavily populated areas, Working Group 1 also recommends assessing the feasibility of relocating federal government receive locations or other methods to maximize commercial use of the top 100 markets by population.[39/]

As a co-chair and leading participant in Working Group 1, T-Mobile believes that the sharing approach outlined in the *WG1 Final Report* provides a workable roadmap that will maximize use of the 1695-1710 MHz band while protecting federal operations. Coordination between federal and commercial users, in particular, will be critical in maximizing the use of the 1695-1710 MHz band, and the *WG1 Final Report* presents a valuable coordination framework to achieve this purpose. T-Mobile specifically supports the adoption of coordination procedures patterned after the process that was used to allow non-federal licensees to gain early access to AWS-1 spectrum.[40/] The Commission and NTIA worked closely in developing the AWS-1 procedures, which provided an orderly mechanism by which to achieve coordination and ensure the protection of federal operations. The procedures, timelines, and requirements included in the AWS-1 procedures are also generally appropriate in the instant case.

37/ *See id.* at 2.

38/ *See id.* at 3.

39/ *See id.* at 7.

40/ *See NPRM* ¶ 67.

As the Commission and NTIA have recognized, however, some of the initial technical parameters and techniques that Working Group 1 developed were conservative.[41/] Further analysis and refinements in the coordination process could reduce the impact of sharing and the size of the Protection Zones, on both a geographic and temporal basis. NTIA and licensees should actively pursue additional ways to refine the coordination interference analysis. If it is not feasible to refine the analysis prior to an auction, the current Protection Zones are adequate for licensing given that the Protection Zones identified in the *WG1 Final Report* only impact a little over 10 percent of the population and that they are structured as Protection Zones that allow for use within the zone pursuant to successful coordination. However, NTIA and the FCC should work with interested parties and federal agencies to continue to refine the interference analysis methods, including through the development of testing procedures and actual testing to develop additional details that could be used as a basis of coordination post-licensing. A solid foundation for post-licensing coordination will speed use of this band and facilitate use within the Protection Zones, including through advanced techniques, such as time-based sharing, in which a 1695-1710 MHz licensee(s) may be able to use the spectrum within the Protection Zone when the affected satellite receiver is either not receiving or is pointed away from the terrestrial operations. Key to success, however, is an interactive process with the 1695-1710 MHz licensee(s) and the agency working to agree on the most appropriate methods for protecting the federal operations while maximizing commercial access to the spectrum.

In response to the Commission's inquiry regarding coordination procedures,[42/] the coordination process must be transparent and responsive. For instance, there should be a single federal point of contact for coordination. In addition, if there is a coordination portal, it must be

41/ *See id.* ¶ 60 (*citing WG1 Final Report* at 4).

42/ *See id.* ¶¶ 65-71.

clear who will operate it. Any coordination portal must be non-proprietary and should be funded through the Spectrum Relocation Fund. Adoption of the approach outlined in the *WG1 Final Report* plus the additional considerations outlined above will allow the Commission to fully realize the potential of this band.

2. Pairing of 1695-1710 MHz

While it is critical for the Commission to adopt an effective federal/non-federal sharing framework for the 1695-1710 MHz band, the band's usefulness for commercial operations will be significantly undermined if it is not paired. As the Commission notes, the 1695-1710 MHz band's use is limited to handset operations because of its proximity to the AWS-1 band.[43/] The Commission also notes that it generally licenses bands supporting mobile broadband services on a paired basis. However, it does not propose to pair the band.[44/] Without a pair, the band has limited utility. Unlike supplemental downlink spectrum, there are few technical or commercial reasons for additional uplink spectrum.

In order to make the best use of the 1695-1710 MHz band, it should be paired with the 2095-2110 MHz band as proposed by CTIA—The Wireless Association ("CTIA").[45/] As the *CTIA Proposal* notes, based on the Spectrum Act's parallel mandates that NTIA and the FCC each identify 15 megahertz of spectrum to be made available for commercial use, it seems "apparent that Congress intended for these two 15 megahertz spectrum bands to complement one

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43/ *See id.* ¶ 44.

44/ *See id.* ¶ 48.

45/ *See Finding the FCC's 15 MHz: Implementation of Section 6401(b)(2)(E) of the Middle Class Tax Relief and Job Creation Act of 2012 – Identification of 15 Megahertz of Contiguous Spectrum for Mobile Broadband* ("*CTIA Proposal*"), *attached to* Letter from Steve Largent, President and CEO, CTIA-The Wireless Association, to Julius Genachowski, *et al.*, Chairman, FCC, GN Docket No. 09-51 (filed March 13, 2013).

another through ready pairing for base and mobile station communications."[46/] Because NTIA has identified the 1695-1710 MHz band as its 15 megahertz, which has been studied by Working Group 1 as a mobile uplink band, pairing it with 2095-2110 MHz as a mobile downlink band would allow the most productive use of both bands.[47/] As discussed by CTIA, not only would this pairing drive greater auction revenues, it would also create synergies, reduce the risk of harmful interference between licensees, and maintain the same duplex distance between uplink and downlink as is used in the AWS-1 band which would allow for the use of existing, proven technology.[48/]

In spite of these significant benefits, if the Commission cannot make the 2095-2110 MHz band in particular available, it should endeavor to pair it with other spectrum rather than leave the band unpaired. If the Commission is unable to find a suitable band to pair with the 1695-1710 MHz band, it should consider seeking a brief delay from Congress to auction this spectrum, rather than auction the band as a standalone uplink band. This brief delay would provide a better long-term solution for the spectrum and would still enable the Commission to auction the other AWS-3 bands by the Spectrum Act's deadline.

B. 1755-1780 MHz

As the Commission notes, and T-Mobile has vigorously advocated, the 1755-1780 MHz band is particularly attractive for conversion to commercial wireless use, as it is located adjacent to the AWS-1 uplink/mobile band at 1710-1755 MHz, is regionally and internationally harmonized for mobile broadband, and can be paired with the 2155-2180 MHz band to

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46/ *Id.* at 11.

47/ *See id.* at 12.

48/ *See id.* at 11-13.

symmetrically extend the AWS-1 band.[49/] As a result, the Commission should adopt a sharing framework for this band which ensures that it realizes its full potential for wireless broadband service.

1. Approaches to Federal/Non-Federal Sharing

a. Industry Roadmap and DoD Alternative Proposal – Favored Approach

The Commission should use the *DoD Alternative Proposal*, which is largely consistent with the suggestions of the *Industry Roadmap*, as the basis for planning for the future use of the 1755-1780 MHz band. As noted in the *NPRM*, T-Mobile filed the *Industry Roadmap*, which is a wireless industry proposal that would make the 1755-1780 MHz band available for commercial use in time to auction the band at the same time as the 2155-2180 MHz band.[50/] The *Industry Roadmap* assesses the entire 1755-1850 MHz band in a manner that considers making the lower 1755-1780 MHz band available first, but also addresses the rest of the band up to 1850 MHz in order to meet federal agencies' concerns.[51/]

The *Industry Roadmap* proposes a combination of sharing, relocation, and channel prioritization for the majority of federal operations in the 1755-1850 MHz band to provide industry early access to the 1755-1780 MHz portion of the band. In particular, under the *Industry Roadmap*, a number of systems for which viable relocation spectrum has been identified would be relocated. This includes Aeronautical Telemetry operations, which would alleviate spectrum crowding pressure on lower bands and provide channelization and prioritization of remaining systems in a way that facilitates the availability of the 1755-1780 MHz band.[52/] The

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49/ *See NPRM* ¶ 33.

50/ *See id.* ¶ 22 (discussing *Industry Roadmap*).

51/ *See Industry Roadmap* at 1.

52/ *Id.* at 1, 4-5.

Industry Roadmap finds that, in some cases, sharing is feasible with no relocation of federal operations, while in other cases, some change in channel prioritization will be necessary to facilitate sharing. This analysis further concludes that work on sharing or relocation options for systems in the 1780-1850 MHz band should continue, including exploration of advanced technology options or relocation bands.[53/]

The *DoD Alternative Proposal* offers an alternative solution "to make the 1755-1780 MHz band available for auction in the near-term, while protecting critical capabilities."[54/] According to DoD's proposal, numerous agency operations can vacate the 1755-1780 MHz band, reducing the need for permanent coordination procedures and protection zones. It also identifies the 2025-2110 MHz band as the preferred option to relocate most of its operations in the 1755-1850 MHz band and has proposed compressing its remaining operations into the 1780-1850 MHz band.[55/] The *DoD Alternative Proposal* represents a thoroughly evaluated solution, "considering the myriad of technical, statutory, and other factors involved," including NTIA's assessment of the 1755-1850 MHz band, CSMAC Working Groups, DoD/industry spectrum monitoring, internal compression studies, and requirements of the Commercial Spectrum Enhancement Act and Fiscal Year 2000 National Defense Authorization Act.[56/]

T-Mobile appreciates DoD's engagement in the process for relocation from, or sharing, the 1755-1780 MHz band. As discussed further below, T-Mobile generally agrees with DoD's approach, although federal relocation to the broader 2025-2110 MHz band should be minimized

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53/ *Id.* at 1-5.

54/ *DoD Alternative Proposal* at 1.

55/ *See id.* at 1; *see also NPRM* ¶ 13 (discussing Lawrence E. Strickling, Assistant Secretary for Communications and Information, NTIA, U.S. Dept. of Commerce, to Julius Genachowski, Chairman, FCC (filed Apr. 19, 2013) ("*NTIA Recommendations Letter*")).

56/ *See DoD Alternative Proposal* at 1.

to the extent possible and relocation to the 2095-2110 MHz portion of that band should be avoided pending further analysis as to the potential for this spectrum to be made available for commercial mobile use. Aeronautical operations are particularly difficult with respect to sharing and use of the 2025-2110 MHz band for such operations, including for high-power operations, should be carefully reviewed.

Further, use of the 2025-2110 MHz band should be implemented in a manner that facilities future sharing. T-Mobile acknowledges that this spectrum is currently used for the Broadcast Auxiliary Service ("BAS") and for certain federal operations. Such operations will need to be taken into consideration in any future use of the band. Federal use of spectrum, in particular, is often time-dependent, and a significant challenge for agencies is coordinating the multiple and varied operations. Requiring use of multiband transceivers as part of a relocation agreement would provide agencies with greater flexibility to coordinate operations over a variety of bands. This would allow a reduction in the amount of spectrum reserved for exclusive federal use, provided they have access when needed to accommodate requirements. Overall the *DoD Alternative Plan* is a practical solution to make the 1755-1780 MHz band available in the timeframe necessary to be paired and auctioned with the 2155-2180 MHz band. However, steps should be taken to ensure that any relocation pursuant to the plan be implemented in a way that provides future opportunities for sharing where appropriate.

b. CSMAC Proposals

The *NPRM*, the *Industry Roadmap*, and the *DoD Alternative Proposal* all contemplate some sharing of the 1755-1780 MHz band. CSMAC Working Groups 2, 3, 4, and 5 have been evaluating spectrum sharing issues related to operation in the 1755-1780 MHz band.[57/] While

[57/] *See NPRM* ¶ 14.

CSMAC had only approved the final report of Working Group 2 at the time the *NPRM* was released,[58/] the remaining three Working Group Reports have since been approved by CSMAC.[59/] In anticipation of this, the *NPRM* requests comment on all CSMAC Working Group Reports regardless of when they were released.[60/]

The recently approved reports from Working Groups 3, 4, and 5 follow a "hybrid" approach for the 1755-1780 MHz band "in which some operations would be relocated, some would share the band with commercial licensees, and some (in geographic exclusion zones) would not share the band."[61/] While the CSMAC work represents a significant collaborative effort between industry and government agencies, the recommendations of the Working Groups are overly conservative, do not represent the real-word interference environments, and should be refined prior to adoption of final rules. Unlike the *DoD Alternative Proposal*, the CSMAC Working Groups assume that more federal agency operations will remain in the 1755-1780 MHz band, inflating the need for permanent coordination procedures and Protection

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58/ *See id.* ¶ 17.

59/ *See* NTIA Release; *see also WG1 Final Report*; CSMAC, *Final Report: Working Group 2: 1755-1850 MHz Law Enforcement Surveillance, Explosive Ordnance Disposal, and other Short Distance Links* (Jan. 4, 2013) ("*WG2 Final Report*"), *available at* http://www.ntia.doc.gov/files/ntia/publications/csmac_wg-2_final_report_jan-4-2012.pdf; CSMAC, *Final Report: Working Group 3 (WG3) Report on 1755-1850 MHz Satellite Control and Electronic Warfare* (July 19, 2013) ("*WG3 Final Report*"), *available at* http://www.ntia.doc.gov/files/ntia/Working_Group_3_Final.pdf; CSMAC, *Final Report: Working Group 4: 1755-1850 MHz Point-to-Point Microwave Tactical Radio Relay (TRR) Joint Tactical Radio System / Software Defined Radio (JTRS/SDR)* (July 24, 2013) ("*WG4 Final Report*"), *available at* http://www.ntia.doc.gov/files/ntia/publications/wg4_final_report_072413.pdf; CSMAC, *Final Report: Working Group 5 (WG-5) 1755-1850 MHz Airborne Operations (Air Combat Training System, Small Unmanned Aircraft Systems, Precision-Guided Munitions, Aeronautical Mobile Telemetry)* (July 23, 2013) ("*WG5 Final Report*"), *available at* http://www.ntia.doc.gov/files/ntia/publications/wg5_final_report_7-22_dfo.pdf.

60/ *See NPRM* ¶ 73.

61/ *Id.* ¶ 75.

Zones.[62/] In most cases the CSMAC Working Group Reports find that sharing is problematic based on the large Protection Zones calculated using extremely conservative assumptions.[63/] Accordingly, the Commission should not, without further evaluation, adopt the proposals of CSMAC Working Groups 3, 4 and 5 as the final basis for sharing in the 1755-1780 MHz band[64/]

62/ The *WG5 Final Report*, for instance, assumes that Precision Guided Munitions and Small Unmanned Aircraft Systems will remain in the 1755-1780 MHz band, but the *DoD Alternative Proposal* contemplates relocating those systems out of the 1755-1780 MHz band.

63/ Separate statements from CSMAC participants also highlight the fact that a number of important questions remain to be addressed. *See Separate Statement of Harold Furchtgott-Roth* (Aug. 2013), *available at* http://www.ntia.doc.gov/files/ntia/publications/furchtgott-roth-csmac_statement_080713_3.pdf ("*Furchtgott-Roth Statement*"); *Separate Statement of Janice Obuchowski* (Aug. 2, 2013), *available at* http://www.ntia.doc.gov/files/ntia/publications/obuchowski_csamc_statement_5aug2013.pdf. Most notably, the option of relocating federal users is not adequately considered. Failure to fully evaluate the possibility of relocation is directly contrary to the Spectrum Act's express preference for clearing over sharing. *See* Spectrum Act § 6701(a); *see also Furchtgott-Roth Statement*. In addition, the recently approved Working Group Reports generally fail to address separately the 1755-1780 MHz band, instead evaluating the larger 1755-1850 MHz band as a whole. While freeing the entire 1755-1850 MHz band for commercial use is the ultimate goal, NTIA and the Commission should prioritize releasing the 1755-1780 MHz band so that it can be auctioned as paired with the 2155-2180 MHz band.

64/ CSMAC participants representing industry interests, including T-Mobile, also issued a separate statement expressing concerns with the three recently approved Working Group Reports. *See Separate Statement Concerning Working Group Reports for the 1755-1850 MHz Band* (Aug. 29, 2013), *available at* http://www.ntia.doc.gov/files/ntia/publications/csmac_separate_statement-aug_29-rev2.pdf ("*Industry Separate Statement*"). The *Industry Separate Statement* notes that the signatories "in no way" endorse the assumptions and methodologies that went into these analyses. Further, these parties expressed their concern that the analyses to date have been "conservative and limited," and "do not represent the real-world interference environment between Federal and commercial users." T-Mobile and the other signatories believe that "additional effort should be initiated that would greatly mitigate the protection zones for Federal operations including, but not limited to, considering other effects such as clutter, more reasonable interference protection limits and considering a more representative LTE system model." *Industry Separate Statement* at 1. The *WG5 Final Report* itself notes industry's belief that certain assumptions underpinning this report are unrealistic. *See WG5 Final Report* at 2. The *Industry Separate Statement* also discusses that because only limited technical data was shared about federal systems, "participants were not able to fully engage in the type of informed discussion of the analysis and underlying assumptions necessary to verify the accuracy of the information," although the statement is hopeful that a recently established nondisclosure agreement process will help foster the exchange of important information. *Industry Separate Statement* at 1. The *WG5 Final Report* likewise discusses the same difficulty regarding information-sharing, and states that it "limited the ability to have fully interactive discussions and analysis between industry and government participants." *WG5 Final Report* at 2.

and should instead focus on the *DoD Alternative Proposal* as the basis for making the 1755-1780 MHz band available.

T-Mobile agrees that the Working Group process was a beneficial first step, but that "additional efforts are necessary to develop realistic representations of the interference environment between Federal and commercial operations."[65/] Further, the analysis included in the CSMAC Working Group Reports should not form the basis for final exclusion or coordination zones for systems that remain in the band. T-Mobile is continuing to work with industry partners and the DoD, including through a "trusted agent" process to refine the analysis and information underlying that analysis to provide more appropriate parameters for sharing.[66/] T-Mobile plans on submitting this analysis in the record for this proceeding as early as possible.

c. "Overlay" Licensing Approach

The Commission anticipates the possibility that CSMAC and NTIA will be unable to recommend clearly defined sharing parameters, and therefore seeks comment on whether to issue "overlay" licenses that would permit new licensees to gain access to the 1755-1780 MHz band only if they are able to reach coordination agreements with affected federal users (*i.e.*, operator-to-operator coordination).[67/] T-Mobile does not support the issuance of "overlay" licenses. Such an approach would be inconsistent with the Spectrum Act's preference to relocate federal users to the maximum extent feasible. An "overlay" approach is also inconsistent with the Commercial Spectrum Enhancement Act,[68/] which provides resources for government agencies

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65/ *Industry Separate Statement* at 1.

66/ The DoD has signed non-disclosure agreements with a number of entities, including wireless carriers, manufacturers and others, generally referred to as a group as "trusted agents", which enable those entities to obtain access to relevant information necessary to evaluate sharing and relocation.

67/ *See NPRM* ¶ 76.

68/ *See* Commercial Spectrum Enhancement Act, Pub. L. No. 108-494, Title II, 118 Stat. 3986 (2004) (codified at various sections of Title 47 of the United States Code).

to study relocation options and to update equipment to facilitate clearing or shared use of spectrum, activities that would not necessarily be undertaken if overlay licenses were issued.

Moreover, an overlay auction would create uncertainty about exactly what rights a licensee obtains. This uncertainty would potentially reduce auction participation and revenues that would be dedicated to the First Responder Network Authority ("FirstNet"), an outcome which would be contrary to the public interest.

III. ADDITIONAL SPECTRUM FOR COMMERCIAL USE

As the Commission notes, the Spectrum Act requires it to identify an additional 15 megahertz of contiguous spectrum for commercial use.[69/] Consequently, the *NPRM* seeks comment on an appropriate candidate for that choice, and also on the allocation of other frequencies in order to meet or surpass this goal.[70/]

A. 1780-1850 MHz

While the Commission is right that the wireless industry is most focused on conversion of the 1755-1780 MHz band to commercial use so that it may be paired and auctioned with the 2155-2180 MHz band,[71/] T-Mobile strongly supports continued review of the rest of the 1755-1850 MHz band – the 1780-1850 MHz band – for long-term commercial use. As noted above, T-Mobile supports the *DoD Alternative Proposal*, which in part proposes that DoD retain access to the 1780-1850 MHz band to accommodate systems now operating at 1755-1780 MHz.[72/] However, T-Mobile urges continued study of the band through joint industry/government efforts to evaluate ways that this band can be made available in the long-term for commercial wireless

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69/ *See NPRM* ¶ 36.

70/ *See id*.

71/ *See id.* ¶ 37.

72/ *See DoD Alternative Proposal* at 1.

broadband. Continued evaluation would be consistent with the Presidential memoranda, which urges NTIA and the FCC to work together to transition federal spectrum to commercial use.[73/] Further study of the 1780-1850 MHz band to determine the feasibility of converting it to commercial use also supports the Commission's goal to make more spectrum available for commercial operations.[74/]

B. 2095-2110 MHz

As noted above, CTIA has proposed that the 2095-2110 MHz band be designated as the additional 15 megahertz specified in the Spectrum Act, and T-Mobile supports this proposal.[75/] As CTIA has discussed, this band is contiguous with current commercial wireless allocations, has propagation characteristics suited to mobile broadband, and can be paired with the 1695-1710 MHz band already identified by NTIA for reallocation.[76/] In addition, as the Commission recognizes,[77/] this band is already home to the BAS, demonstrating that higher power operations in this band can coexist with existing federal operations. Despite the fact that there may be challenges involved with freeing the band for commercial use, T-Mobile believes that the band should continue to be analyzed to determine whether these challenges can be overcome.

More generally, the Commission should leave open the possibility that spectrum in the entire 2025-2110 MHz band could be made available for wireless broadband. The *NPRM* notes that the National Aeronautics and Space Administration ("NASA") performed a compatibility study examining the potential for LTE systems to share the band with forward link transmissions

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73/ *See generally 2010 Presidential Memorandum*; *2013 Presidential Memorandum*.

74/ *See NPRM* ¶ 1.

75/ *See CTIA Proposal* at 12.

76/ *Id*.

77/ *See NPRM* ¶ 20.

from NASA geostationary Tracking and Data Relay Satellite System ("TDRSS") satellites.[78/] This study found that high-density terrestrial base stations or user equipment operating co-frequency in the 2025-2110 MHz band would exceed established protection criteria for the TDRSS spaceborne receivers by an average of 16.4 dB to 40.7 dB, and that analysis of sharing with satellite systems of other administrations would likely show similar results.[79/]

The Commission should not allow the *NASA Study* to impede its continued evaluation of the 2025-2110 MHz band; the *NASA Study* is flawed in several respects. First, the *NASA Study* selectively picks from the CSMAC efforts. For instance, it fails to use the propagation model, inter-site distance, LTE channel bandwidth, clutter factor, scheduler algorithm, Monte Carlo approach, and other such details as agreed upon by CSMAC's Working Groups. Moreover, the methodology and intermediate calculations in the *NASA Study* do not track similar CSMAC-adopted techniques and values.

Second, the *NASA Study* is inconsistent with the Working Group 3 Report, which is the only CSMAC report that considered a similar interference scenario of terrestrial transmitters and satellite receivers. In the *WG3 Final Report*, DoD concluded that there was minimal potential for interference from terrestrial LTE handsets to orbiting satellite receivers.[80/]

Last, T-Mobile questions the *NASA Study*'s input parameters and intermediate values. For instance:

- Based on the CSMAC inter-site distance recommendations, the *NASA Study* used 1201 LTE sites for cities exceeding 250,000 pops and 420 LTE sites for cities

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78/ *See id.* ¶ 21.

79/ *See id.*; United States of America, *Feasibility Assessment for Accommodation of Mobile Broadband Long Term Evolution (LTE) Systems in the 2 025-2 110 MHz Band*, Document 4-5-6-7/170-E (July 16, 2013) ("*NASA Study*"), *attached to* NTIA July 2013 Letter.

80/ *See WG3 Final Report* at 2.

with 100,000 to 250,000 pops.[81/] The United States has 135 cities over 250,000 pops and, according to the *NASA Study*, in total 249 cities over 100,000 pops. If rural cells are completely neglected, the total projected number of cells across the U.S. considered in the *NASA Study* is 135 * 1201 + (249-135) * 420 = 210,015 cells. But, the largest mobile network in the U.S. has approximately 60,000 sites, meaning that NASA materially overestimates the number of cell sites.

- Table 2 of the *NASA Study* evaluates a scenario where base stations are deployed in the band.[82/] The table creates a point source above each city with an aggregate power per city. For a city with a population of greater than 250,000 people, the value in the *NASA Study* is 78.6 dBm, or 72.4 kW of power. Those numbers are unrealistically and extraordinarily large.
- For the scenario where handsets are deployed in the band, paragraph 9 of Appendix 3 of the *NASA Study* suggests equally unrealistic numbers. For large cities, the aggregate power level is 49.2 dBm, or 83.2 W of power, and for small cities, the aggregate power level is 46.8 dBm, or 47.8 W of power.[83/] Again, those numbers are unrealistically large.

Consequently, the *NASA Study*'s results should not be considered the definitive analysis of the potential for commercial use of this band. Additional work must be done to address the numerous flaws in NASA's work.

T-Mobile also notes that while DoD should be able to move forward with its proposal to relocate systems to the 2025-2095 MHz band, DoD should avoid locating systems in the 2095-

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81/ *See NASA Study* at 8.

82/ *See id.* at 7.

83/ *See id.* at 23-24.

2110 MHz band until there is a determination whether the band will be made available for commercial operations, as CTIA proposes.

IV. INCREASED FEDERAL ACCESS TO SPECTRUM

A. Federal Use of AWS-3 Spectrum

Recognizing that shared use of spectrum bands by federal and non-federal users could facilitate the increased use of "commercial-off-the-shelf" communications technologies for government users, the Commission seeks comment on whether federal users should be able to access the AWS-3 bands, including spectrum not presently allocated for federal use, *e.g.*, 2155-2180 MHz, on federal lands or properties that are generally unserved by commercial wireless networks.[84/] T-Mobile does not object to federal use of non-federal spectrum in areas where wireless providers are not generally providing service. Allowing shared use of AWS-3 spectrum could produce economies of scale and scope in the equipment market for both federal and non-federal users, lowering costs and speeding implementation.

However, it is premature for the Commission to adopt rules for sharing in commercial bands at this time. As discussed above, there is a clear and urgent need for the Commission to bring additional spectrum to market for mobile broadband services, and T-Mobile has consistently emphasized the need for the Commission to promptly put this valuable spectrum to use. As the CSMAC Working Group effort demonstrated, developing viable sharing recommendations is a difficult and resource-intensive effort and future work to understand the potential for federal use of commercial spectrum can benefit from current efforts as they are successfully implemented. Moreover, with appropriate regulatory approvals, the FCC's secondary market rules already provide opportunities for sharing in the band. The Commission

84/ *See NPRM* ¶¶ 80-81.

should therefore adopt service rules for and auction the AWS-3 spectrum now and re-evaluate federal sharing of commercial spectrum at a later date and as the federal requirements for additional spectrum versus more efficient use of spectrum are better understood.

B. Increased Federal Access to the 2025-2110 MHz and 5150-5250 MHz Bands

The Commission also seeks comment on proposals that would allow federal users to be relocated to other non-federal bands – the 2025-2110 MHz band and/or the 5150-5250 MHz band – as well as the viability of repacking federal incumbents in the 1780-1850 MHz band.[85/] This request is partly in response to DoD's proposal to relocate most of its operations to the 2025-2110 MHz band, which it would utilize on a shared basis.[86/]

As noted above, T-Mobile supports DoD's proposal for access to the 2025-2110 MHz band. However, equipment should be capable of operating on multiple bands to help provide scheduling flexibility and access to the band should be limited to the extent possible while the band is studied for commercial mobile use on a shared basis. To limit the impact on the 2025-2110 MHz band, as many federal uses as possible, particularly hard-to-move systems, should be consolidated in the 1780-1850 MHz band with the 2025-2110 MHz band only used as needed. In addition, if the 2095-2110 MHz band is dedicated for commercial use, as CTIA and T-Mobile suggest, and DoD is provided with access to the remainder of the 2025-2110 MHz band, this should provide DoD with sufficient access to spectrum as it would receive 70 megahertz of spectrum in exchange for the use of the 25 megahertz of spectrum it would relinquish in the 1755-1780 MHz band.

85/ *See id.* ¶ 82.

86/ While NASA and DoD had previously identified the 5150-5250 MHz band as a comparable destination for aeronautical mobile telemetry systems, DoD recently rejected the 5150-5250 MHz band as a relocation target. *See DoD Alternative Proposal* at 1; *NTIA Recommendations Letter* at 3.

V. BAND USE CONFIGURATIONS

A. Base vs. Mobile Transmissions

In order to avoid interference to base station operations in the adjacent AWS-1 downlink band (2110-2155 MHz) and AWS-4 downlink band (2180-2200 MHz), as well as mobile-to-mobile interference in the 2155-2180 MHz band, the Commission proposes allowing base and fixed (downlink), but not mobile, operations in the 2155-2180 MHz band.[87/] Similarly, the Commission proposes allowing only low-power mobile (uplink), but not high-power fixed or base station, operations in the 1695-1710 MHz and 1755-1780 MHz bands when enabled by base stations that are either outside of Protected Zones or inside Protection Zones and coordinated with federal users.[88/] For the 2020-2025 MHz band, the FCC proposes low-power mobile and low-power fixed (uplink) operations.[89/]

T-Mobile generally supports the Commission's proposed band use configurations. In particular, because of the frequency locations noted above, T-Mobile agrees that the 1695-1710 MHz and 2020-2025 MHz bands are properly characterized as uplink bands given current information. However, as of today, these would be unpaired spectrum bands. They would be less useful for wireless broadband without paired downlink spectrum. As T-Mobile has previously pointed out,[90/] unpaired uplink spectrum has limited utility and could hinder competition because new and expanding entrants would need to spend considerable resources acquiring the downlink portion without any assurance that they could acquire the spectrum in other bands. In contrast, paired spectrum allows established licensees and new entrants to

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87/ *See NPRM* ¶ 43.

88/ *See id.* ¶¶ 44-46.

89/ *See id.* ¶¶ 44-46, Appendix A.

90/ *See* Comments of T-Mobile USA, Inc., GN Docket No. 12-268, at 5-6 (filed Jan. 25, 2013) ("T-Mobile Incentive Auction Comments").

acquire *all* the critical spectrum inputs needed for their business at once, allowing them to deploy and expand their next-generation services more quickly and efficiently.

As suggested above, there are several options for pairing the 1695-1710 MHz band with other spectrum. T-Mobile, like CTIA, proposes that the Commission pair the 1695-1710 MHz band with the 2095-2110 MHz band or, if that spectrum is not available, with an alternative 15 megahertz of spectrum. T-Mobile is hopeful that the Commission can find a partner for the 1695-1710 MHz band and auction and license the spectrum before the February 2015 deadline set forth in the Spectrum Act; but, as indicated earlier, if this is not feasible, T-Mobile would support the Commission requesting a brief delay from Congress to auction this spectrum rather than having the Commission proceed to auction it unpaired.[91/]

The Commission should also evaluate how to best use the 2020-2025 MHz band. One option would be for the Commission to consider providing DoD with access to the 2020-2025 MHz band if it allows the 15 megahertz at 2095-2110 MHz band to be paired with 1695-1710 MHz.[92/] In any case, the Commission should undergo this evaluation with the goal of maximizing the availability of paired spectrum. The most appropriate use of the 2020-2025 MHz band is also contingent on the outcome of the waiver recently sought by DISH in which it seeks flexibility to use the 2000-2020 MHz band for terrestrial downlink operations rather than the currently permitted uplink use.[93/] Because this spectrum is immediately adjacent to 2020-

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91/ *See* Spectrum Act § 1451.

92/ Note that allowing DoD use would not require Congressional action because the spectrum is not required to be auctioned by the Spectrum Act.

93/ *See* Petition for Waiver of Sections 27.5(j) and 27.53(h)(2)(ii) and Request for Extension of Time (Sept. 9, 2013), *attached to* Letter from Jeffrey H. Blum, Senior vice President & Deputy General Counsel, DISH Network Corp., to Chairwoman Mignon Clyburn, FCC, WT Docket No. 12-69 (filed Sept. 10, 2013); *Wireless Telecommunications Bureau Opens Docket to Seek Comment on DISH Network Corporation's Petition for Waiver and Request for Extension of Time*, Public Notice, WT Docket No. 12-225, DA 13-1877 (rel. Sept. 13, 2013).

2025 MHz, reversing the direction of use would generally require that 2020-2025 MHz also be used for downlink operations, which could be licensed on an unpaired basis for supplemental downlink. However, this use must be evaluated against other options, including whether the Commission could facilitate making the 2095-2110 MHz band available for paired use with the 1695-1710 MHz band.

B. Spectrum Block Sizes, Configurations, and Service Areas

The Commission proposes licensing the AWS-3 spectrum in five-megahertz blocks and seeks comment on the appropriate spectrum block configuration, including whether the spectrum should be licensed on a paired basis, matching specific uplink and downlink bands.[94/] It specifically asks whether it should require uplink/mobiles in the 1695-1710 MHz and 1755-1780 MHz bands to transmit only when controlled by an associated base station whose location can be coordinated with relevant federal users in certain Protection Zones.[95/] In addition, the Commission proposes licensing all AWS-3 spectrum blocks using Economic Areas ("EA"), because EA licenses closely match the licensing approach in the nearby AWS-1 and AWS-4 bands, potentially allowing AWS-3 licensees to aggregate their licenses with AWS-1 and AWS-4 licenses.[96/]

T-Mobile supports the Commission's proposal to license the AWS-3 spectrum using five megahertz blocks. As T-Mobile has explained and the Commission recognizes, five megahertz blocks are sufficiently large to support a variety of wireless broadband technologies, including broadband Internet access, and would allow for channel aggregation, in which smaller channels can be bonded together for greater performance, particularly for advanced mobile broadband

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94/ *See NPRM* ¶¶ 47-48.

95/ *See id.* ¶ 48.

96/ *See id.* ¶¶ 49-52.

applications such as LTE.[97/] For the reasons discussed above, T-Mobile also supports pairing the spectrum and, in particular, proposes pairing the 2155-2180 MHz band with the 1755-1780 MHz band.

In general, T-Mobile does not oppose a requirement that mobile devices be under the control of, or associated with, a base station as a means to facilitate shared use of the band and prevent interference to federal operations. Prior to transmitting, LTE user devices listen for system information being broadcast by the base station. Based on the system information, the user device will transmit a RACH (Random Access Channel), in order to get the cell to grant downlink/uplink radio resources. Because the mobile device does not transmit until receiving system information from the base station, the mobile device is clearly under the control of the base station and any rule should be consistent with this type of operation. In addition, provisions should be made to allow devices to operate that are not under the control of a base station if that can be accomplished in a manner consistent with protection requirements to federal operations.

Further, T-Mobile generally supports licensing the AWS-3 spectrum using EA service areas, which would be consistent with the licensing regime of other similar wireless spectrum blocks. Licensing spectrum on an EA basis appears to strike a proper balance between the competing factors that impact the Commission's decisions on geographic license size.

VI. TECHNICAL RULES

A. Out-of-Band Emissions ("OOBE") Limits

The Commission seeks comment on extending the OOBE limits applicable to the AWS-1 and AWS-4 bands to the AWS-3 bands, proposing: (1) for AWS-3 operations at 1695-1710 MHz, an OOBE limit of 43 + 10 log10 (P) dB for operations below 1695 MHz and above 1710

97/ *See id.* ¶ 47; T-Mobile Incentive Auction Comments at 14-15.

MHz; (2) for AWS-3 operations at 1755-1780 MHz, an OOBE limit of 43 + 10 log10 (P) dB for operations below 1755 MHz and above 1780 MHz; (3) for AWS-3 operations at 2020-2025 MHz, an OOBE limit of 43 + 10 log10 (P) dB for operations below 2020 MHz and above 2025 MHz; and (4) for AWS-3 operations at 2155-2180 MHz, an OOBE limit of 43 + 10 log10 (P) dB for operations below 2155 MHz and above 2155 MHz.[98/] It also proposes utilizing a one megahertz bandwidth measurement to determine compliance with the OOBE limits.

T-Mobile supports the Commission's proposal to make the AWS-3 OOBE rules, including the measurement of OOBE, consistent with the AWS-1 and AWS-4 rules where possible. The OOBE rules applicable to the AWS-1 and AWS-4 bands are familiar to licensees and have generally proven to be sufficient in addressing interference concerns. Moreover, harmonizing the rules for the AWS-3 bands with the rules for the AWS-1 and AWS-4 bands, where feasible, will help make the most efficient use of these bands.

B. Antenna Height Restrictions and Co-Channel Interference

The Commission similarly proposes applying the flexible antenna height rules applicable to the AWS-1 band to the AWS-3 bands, where applicable.[99/] To address the possibility of co-channel interference between geographically adjacent licenses, the Commission proposes to apply the AWS-1 and AWS-4 rules, which set a field strength limit from base stations of 47 dBμV/m at the edge of the license area, to the 2155-2180 MHz band.[100/] Further, the FCC proposes to permit adjacent area licensees to agree to a higher field strength limit.

98/ *See NPRM* ¶¶ 86-95.

99/ *See id.* ¶¶ 96-98. The Commission notes that since it proposes not to authorize fixed stations in the 1695-1710 MHz or 1755-1750 MHz band, no height limits are necessary for such stations. It also states that the height limit for fixed stations operating in AWS-1 spectrum is not necessary for low-power fixed stations in the 2020-2025 MHz band and proposes to apply the same rules that govern low-power fixed stations in the AWS-4 band to such stations. *See id.*

100/ *See id.* ¶ 104.

T-Mobile supports the proposed rules regulating antenna heights and co-channel interference, including the requirements to coordinate AWS-3 base station operations. T-Mobile agrees with Sprint Nextel Corp. ("Sprint") that it is not appropriate for the Commission to use the current 47 dBμV/m limit because it is based on legacy technologies and would result in a comparatively lower power level.[101/] Instead, as Sprint suggests, a boundary limit that adjusts for large differences in channel bandwidths may be appropriate since today's LTE transmissions may operate over bandwidth up to 20 megahertz and potentially larger bandwidth in the future.[102/] T-Mobile suggests that the co-channel limit should be set on a per megahertz basis.

T-Mobile, however, like the Commission, disagrees with the 62 dBμV/m per megahertz limit proposed by Sprint because it is based on a 30 kilohertz Digital AMPS signal. Similarly, Verizon Wireless's ("Verizon's") proposed field strength limit of 50 dBμV/m per megahertz may not be an optimal solution for this band, particularly because it was originally proposed in the incentive auctions proceeding and Verizon does not explain how its proposed limit is derived.[103/] T-Mobile alternatively proposes a 54 dBμV/m per megahertz limit, which is based on GSM technology and provides a 7 dB increase over today's rules. In any case, the optimal arrangement is for licensees to agree on mutually acceptable co-channel power limits and that flexibility should be preserved in the rules.

C. Power Limits

For handset operations (mobiles and portables) in the 1695-1710 MHz and 1755-1780 MHz bands, the Commission proposes an EIRP power limit of 20 dBm (100 mW).[104/] T-Mobile

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101/ *See id.* ¶¶ 105-106.

102/ *See id.* ¶ 105 (citing Reply Comments of Sprint Nextel Corporation, WT Docket No. 12-357, at 9 (filed March 7, 2013)).

103/ *See* Comments of Verizon and Verizon Wireless, GN Docket No. 12-268 (filed Jan. 25, 2013).

104/ *See NPRM* ¶¶ 102-103.

opposes a strict 20 dBm limit on mobiles and handsets. Instead, the rules should parallel the rules for AWS-1, which permit power up to 30 dBm.[105/] As the Commission recognizes, "similar commercial mobile services such as PCS, AWS-1 and the 700 MHz band deploy handsets using a variety of technologies, including CDMA and UMTS, as well as LTE, whose devices most commonly operate at a maximum EIRP of 23 dBm (200 mW) regardless of higher FCC power limits."[106/] Moreover, the distance at which coordination around Protection Zones is required should be based on different power levels as provided in the current rules governing the protection of federal government operations by AWS-1 licensees.[107/]

VII. LICENSING AND OPERATIONAL RULES

A. Performance Criteria

The Commission proposes build out requirements that would obligate an AWS-3 licensee to provide signal coverage and offer service to at least 40 percent of the population in each licensed area within four years and at least 75 percent of the population within 10 years.[108/] It also proposes to require licensees to file a "renewal showing" separate from the interim and final build out requirements, suggesting specific criteria, consistent with the H Block rules, under which renewal requests would be evaluated.[109/]

T-Mobile supports the proposed build out schedule, although the build out requirements should take into consideration any Protection or Exclusion Zones, or other federal impediments to complete use of auctioned spectrum. A lengthy build out schedule, such as the rule adopted by the FCC permitting AWS-1 licensees to provide "substantial service" at the end of their 15-

105/ *See id.* ¶ 102; 47 C.F.R. § 27.50(d)(4).

106/ *NPRM* ¶ 102.

107/ *See* 47 C.F.R. § 27.1134.

108/ *See NPRM* ¶¶ 126-129.

109/ *See id.* ¶¶ 134-137.

year license time without an interim construction requirement,[110/] could delay deployment of services and should not be adopted for AWS-3 spectrum. In fact, the AWS-1 build out requirements resulted in a long lead time for some carriers to put spectrum into operation and, in some cases, spectrum warehousing with some spectrum speculators sitting on the spectrum for years. The proposed build out requirements would help to prevent a similar situation. However, the Commission should remain open to case-by-case relief if it proves that government use impedes build out longer than anticipated.

Consistent with its position in the H Block as well as other proceedings, [111/] T-Mobile opposes the creation of a separate "renewal" showing for AWS-3 licensees. The proposed "renewal showing" is ambiguous and fails to adequately define an objective standard for license renewals.[112/] An additional demonstration also creates unnecessary regulatory burdens, requiring significant staff time and administrative resources to review and act upon the volumes of information that would be required, further delaying license renewals. Licensees meeting the final build out requirement will have sufficient economic incentives to provide service and therefore should obtain a renewal expectancy at the end of their license terms.

110/ *See* 47 C.F.R. §§ 27.13, 27.14.

111/ *See, e.g.*, Comments of T-Mobile USA, Inc., WT Docket No. 12-357, at 8-9 (filed Feb. 6, 2013) ("T-Mobile H Block Comments"); Comments of T-Mobile USA, Inc., WT Docket No. 10-112 (filed Aug. 6, 2010) ("T-Mobile WRS Renewals Comments"); Reply Comments of T-Mobile USA, Inc., WT Docket No. 10-112 (filed Aug. 23, 2010); *see also Amendment of Parts 1, 22, 24, 27, 74, 80, 90, 95, and 101 to Establish Uniform License Renewal, Discontinuance of Operation, and Geographic Partitioning and Spectrum Disaggregation Rules and Policies for Certain Wireless Radio Services*, Notice of Proposed Rulemaking and Order, 25 FCC Rcd 6996 (2010).

112/ *See* T-Mobile H Block Comments at 8; T-Mobile WRS Renewals Comments at 1-2.

B. Competitive Bidding Procedures

Finally, the Commission proposes to conduct any auction for AWS-3 licenses in conformity with its general competitive bidding rules,[113/] and asks for input on alternative licensing arrangements that could facilitate ongoing operator-to-operator negotiations between licensees in commercial bands and federal agencies occupying complementary federal bands in the event that sharing or relocation for exclusive use is not possible.[114/] Specifically, and as noted above, the Commission asks if the licenses for the commercial bands could be paired with an "overlay" license in the federal bands, provided that commercial use of such bands would be entirely contingent upon successful coordination with incumbent federal users.

T-Mobile generally supports the use of the Commission's usual competitive bidding procedures. Although T-Mobile supports operator-to-operator negotiations post-auction in order to maximize commercial licensees' access to federal spectrum, it does not, for the reasons discussed above, support "overlay" licenses.[115/]

113/ *See NPRM* ¶¶ 147-148.

114/ *See id.* ¶¶ 159-161.

115/ *See supra* Section II.B.1.

VIII. CONCLUSION

In order to foster the growth of competition and innovation in the wireless marketplace and ensure that the AWS-3 spectrum is put to its best and highest use, T-Mobile respectfully requests that the Commission promptly take the actions outlined above.

Respectfully submitted,

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